Trend Map: A Bibliometric Exploration of the Utilization of Chemical Education Bulletins in the Digital Age

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Abstrak

Analisis bibliometrik penelitian dengan tema buletin pendidikan kimia dari tahun 2020 hingga 2024 menemukan 49 artikel ilmiah dipublikasikan selama periode tersebut. Sitasi total 365, dengan rata-rata 7.45, menunjukkan bahwa penelitian ini telah banyak dibahas dan diperhatikan dalam literatur ilmiah lainnya. Hasil utama menunjukkan bahwa tren penelitian ilmiah untuk istilah "buletin pendidikan kimia" adalah pembelajaran, dengan penekanan pada penciptaan metode pengajaran baru, strategi pembelajaran yang efektif, dan inovasi dalam pendidikan kimia. Menunjukkan minat yang kuat dalam meningkatkan kualitas pembelajaran dan pengajaran kimia.
Kata Kunci: Bibliometrik, buletin pendidikan kimia, sebaran tren

Abstract

A bibliometric analysis of research on the theme of chemical education bulletin from 2020 to 2024 found 49 scientific articles published during the period. The 365 total citations, with an average of 7.45, indicate that this research has been widely discussed and noticed in other scientific literature. The main results show that the trend of scientific research for the term "chemistry education bulletin" is learning, with an emphasis on the creation of new teaching methods, effective learning strategies, and innovations in chemistry education. There is indeed a strong interest in improving the quality of chemistry learning and teaching.
Keywords: Bibliometric, chemical education bulletins, trend map

1. INTRODUCTION

Scientific literature published on a certain subject or topic is evaluated and analyzed using quantitative approaches in a research process known as bibliometric analysis of scientific papers. Finding patterns, trends, and features in scientific papers is the major goal, along with comprehending the significance and value of such research in the scientific community. Finding the data source that will be used for analysis is essential. These might be databases that have millions of scientific publications from different fields, including PubMed, Scopus, Web of Science, and Google Scholar (Takahashi et al., 2023). Selecting a sample of articles that are pertinent to the subject or area of interest comes next once the data source has been identified. The selection of this sample may be predicated on certain keywords, a time frame, or other pertinent factors. Each sample article's pertinent data is analyzed and extracted (Damen et al., 2023). This contains details like the title of the piece, the author, the year and journal of publication, the quantity of citations, and more.

The distribution of articles each year, the distribution of journals that publish papers most frequently, and other general features of the articles were all described using descriptive analysis

(Ammirato et al., 2023). Measuring a scientific article's influence by counting the number of citations it obtains from other papers is a crucial component of bibliometric analysis (D. Li et al., 2023). An understanding of the significance and impact of research within the scientific community may be gained through citation analysis. The findings of the analysis are graphically shown using data visualization techniques, such as co-author networks, heat maps, bar charts, and line graphs (Umar et al., 2023). Scientific article bibliometric analysis is a helpful technique for better understanding the trends, developments, and effects of research on a subject (Haba et al., 2023). It may also assist decision-making for researchers, academic institutions, and other stakeholders.

Periodic publications with an emphasis on education-related subjects are called education bulletins (Akcay & Benek, 2024). They seek to give current information, analysis, reviews, or articles on a variety of educational topics. They are often produced regularly, such as monthly or quarterly. Education bulletins often feature essays, reviews, or analyses that are grounded on empirical research or real-world educational experience (Weng & Chiu, 2023). It could address subjects including education policy, instructional strategies, the most recent research, advances in learning, program assessment, and other pertinent education-related themes (Okoye et al., 2023). The purpose of education bulletins is to serve as a resource for a variety of readers, including parents, students, educators, school administrators, educators, and researchers (Ahmar & Azzajjad, 2023). The details provided might aid readers in comprehending the most recent advancements.

Education bulletins frequently serve as a forum for writers to communicate their expertise, insights, and discoveries to the larger education community. This encourages further advancement in the area of education by facilitating the sharing of concepts and best practices among educators (Azzajjad et al., 2023). Teachers, administrators, and other education professionals can use education bulletins as a tool to assist their professional growth. The newsletter's articles can offer helpful perspectives, methods, and materials to advance knowledge and abilities in teaching.

Research Information Systems (RIS) may be used to conduct bibliometric analysis of articles found in educational newsletters (Alqudah et al., 2023). This is crucial since it allows us to uncover new research trends related to education (Crompton & Burke, 2023). Understanding the most talked-about subjects and well-liked avenues for future research in the sector might be aided by this (Nayak et al., 2023). Where there are information gaps or areas where research in educational newsletters is still less exploratory, bibliometric analysis might be helpful (Garg et al., 2023). This can assist researchers in identifying pertinent and significant avenues for future study to fill up current gaps (Ahmar et al., 2023).

We can assess the significance and applicability of articles in educational newsletters using bibliometric analysis. To determine how significant the publications are in the scientific community, we may accomplish this by counting the citations that each article has earned (Lund et al., 2023). It is possible to gauge the effectiveness of the instructional bulletin by using bibliometric analysis. We may assess how successfully the educational newsletter serves as a forum for research and information exchange by examining the quantity and caliber of articles it publishes, as well as their influence within the scientific community. Strategic planning within educational institutions or the formulation of educational policies can be informed by the findings of bibliometric analysis (J. Li et al., 2023; Suparman et al., 2024). Determining research priorities, allocating resources, and creating more effective policies can all be aided by the knowledge gathered from this type of study. We may obtain important insights into the evolution, significance, and applicability of research in the educational environment by performing a bibliometric analysis of articles in educational newsletters using RIS. These findings can provide the groundwork for future studies in this area (Azzajjad & Ahmar, 2024).

Researchers may do in-depth analysis thanks to the platforms Publish or Perish and VOSviewer, which give users access to a variety of bibliometric data sources including Google Scholar, Web of Science, and Scopus. Because of their user-friendly and straightforward interfaces, researchers with different levels of experience may do bibliometric analysis on both systems without requiring specific programming knowledge. Numerous potent analytic tools, including citation analysis,

cluster analysis, network visualization, and more, are included in both Publish or Perish and VOSviewer. These tools facilitate the acquisition of a profound understanding of the organization and patterns found in the body of scientific literature. Both systems are somewhat adaptable in that they let researchers tailor the analytic parameters to the particular requirements of their study, hence enabling different approaches to the analysis.

Certain data sources may not be accessible through these platforms, and it may be difficult to get the information needed for bibliometric analysis if researchers lack access to institutional subscriptions or paid memberships. Although these platforms offer a wide range of analytical tools, less experienced researchers may find it difficult to analyze the data since it needs a strong grasp of statistical and bibliometric principles. Even if the platform has a wealth of analytical options, certain complex functions could not be accessible by default and need the usage of other software or sophisticated customization (Santamaría-Vázquez et al., 2023). The caliber of the input data has a significant impact on the caliber of the findings of bibliometric analyses. The validity and applicability of the analytic conclusions may be impacted by erroneous or inadequate data.

The platform's ongoing evolution presents chances to create new, more advanced, and potent analytical techniques that tackle the difficulties of bibliometric analysis. There are chances to work together on the creation and implementation of more potent and sophisticated bibliometric analysis techniques with platform developers or other scholars (Garcia, 2023). Possibilities exist to make the platform more accessible to researchers from various locations and backgrounds, such as by creating a more user-friendly and reasonably priced version of the platform. The importance of bibliometric analysis in research and decision-making is becoming more widely recognized, which may present chances for the platform to be used more broadly across disciplines and industries.

Other systems for bibliometric analysis are in rivalry with each other and might provide distinct benefits or features, endangering Publish or Perish and VOSviewer's market shares. The availability of data needed for bibliometric analysis may be impacted by threats to fundamental data access, such as modifications to policies made by data providers or businesses. Technological and bibliometric analysis advances might render these platforms obsolete if they are not updated or improved promptly to reflect the most recent advancements. The availability and value of data for bibliometric analysis may be impacted by criticism and stronger laws on the usage and release of research data due to threats to privacy and ethics in this area.

2. METHODS

Quantitative research approaches include those that use VOSviewer and Publish or Perish to analyze scientific papers bibliometrically. In quantitative research, data that can be quantified quantitatively is gathered, and after statistical analysis, the data is examined to identify patterns, trends, and correlations among the variables. Regarding bibliometric analysis using VOSviewer and Publish or Perish, Software called Publish or Perish gathers bibliometric information from sites like Google Scholar, including citation counts, author factors, and h-indices. After that, the data may be objectively examined to provide metrics like the effect of the study, the productivity of the researchers, and trends in the research within a field. Network analysis and display of bibliometric data are done with VOSviewer. Researchers may examine patterns of links between authors, study subjects, and keywords in scientific papers using VOSviewer. Additionally, this approach might shed light on research cooperation, idea flows, and clusters of related studies. With the use of these applications, researchers may do quantitative analysis of scientific literature in a sophisticated framework that enables them to investigate and comprehend the features and dynamics of a specific research corpus. Thus, using VOSviewer and Publish or Perish.

Perform a bibliometric study of chemical education newsletters from 2020 to 2024 using VOSviewer and Publish or Perish. Publish or Perish may be used to find scientific publications published in chemical education newsletters between 2020 and 2024. You'll utilize "chemistry education bulletin"-related keywords. Using Publish or Perish, you will search for papers and then

extract bibliometric data from them, such as the number of citations, author factors, and h index. To do visual analysis, load the retrieved data into VOSviewer. VOSviewer may be used to create network maps that illustrate the connections between authors, keywords, and study topics in the scientific publications that have been found. Following the completion of the visual analysis, the chemistry education literature will be examined for patterns and trends. This involves determining the subjects that are covered the most, the writers who produce the most, and the newly developing research clusters. To better understand the dynamics and evolution of research in chemical education newsletters during the analyzed period, interpret the bibliometric analysis results. Using bibliometric analysis tools like Publish or Perish and VOSviewer, it will be feasible to obtain a more comprehensive picture of the contributions and trends in chemical education literature across the examined time range by following these steps.

3. RESULTS AND DISCUSSION

Key research trends in chemistry education from 2020 to 2024 have been identified by bibliometric analysis. These trends include the use of technology in chemistry education, research on successful teaching techniques, and research on creative chemistry curriculum building. Through the use of VOSviewer, an analysis of chemistry education newsletters was conducted to identify developing research clusters. These clusters included those centered around the creation of project-based learning materials and the use of technology in chemistry education. identifying individual papers or writers who, depending on the number of citations or their standing in collaborative networks, have made a substantial contribution to the literature on chemistry education throughout the years. publishing trends in chemistry education newsletters, such as a surge in collaborative research or spikes in publications on particular subjects or sub-disciplines in particular years.
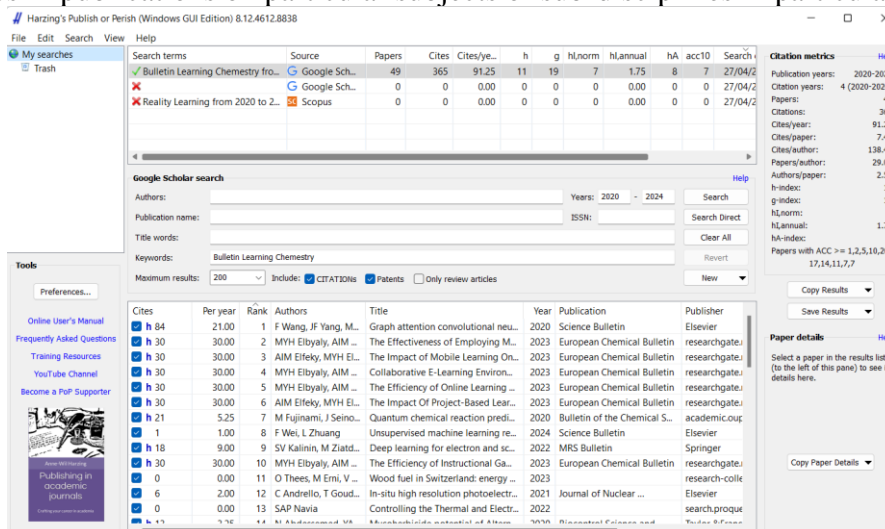

Figure 1. Results of bibliometric analysis on the search for data on chemical education bulletin studies using publish or perish

The Chemical Education Bulletin has 49 scientific publications published between 2020 and 2024. The sum of all these articles' citations is 365. There were 91.25 citations on average per year. This shows how many citations these papers typically earned annually during the course of the study period. There were 7.45 citations on average per article. This shows the average amount of citations that any scientific paper has accumulated over time. Averaging 138.43 citations per author was the result. This shows the average number of citations that each author who contributed to a scientific paper in the Chemical Education Bulletin throughout the course of the time obtained.

The 49 scientific publications that make up the Chemical Education Bulletin have 365 citations in total. The quantity of citations indicates the frequency with which other researchers have referenced the publications in the scientific literature, indicating the significance and influence of

the study within the scientific community. An article's impact on future study and scientific advancement increases with the number of citations it receives. There are 91.25 citations on average per year. According to this data, since their inception, publications in the Chemical Education Bulletin have garnered, on average, 91 citations annually. This suggests that studies done in the area of chemistry education will always be interesting and relevant to other researchers in the field.

There were 7.45 citations on average per article. The average number of citations that each scientific paper in the Chemical Education Bulletin got during the study period is shown in this figure. Each publication in the scientific literature has a stronger individual influence the higher this number is. Averaging 138.43 citations per author was the result. The influence and contribution of the writers to the Chemical Education Bulletin are depicted in this image. The bigger this number, which reflects the caliber and significance of the writers' research, the more influential each author is individually within the scientific community. With a comparatively high number of citations and an outstanding average of citations per article, the bibliometric analysis results indicate that the articles in the Chemical Education Bulletin have a considerable effect on the scientific literature. This shows that the chemical education research that is published in the bulletin contributes significantly to the advancement of chemical education theory and practice.
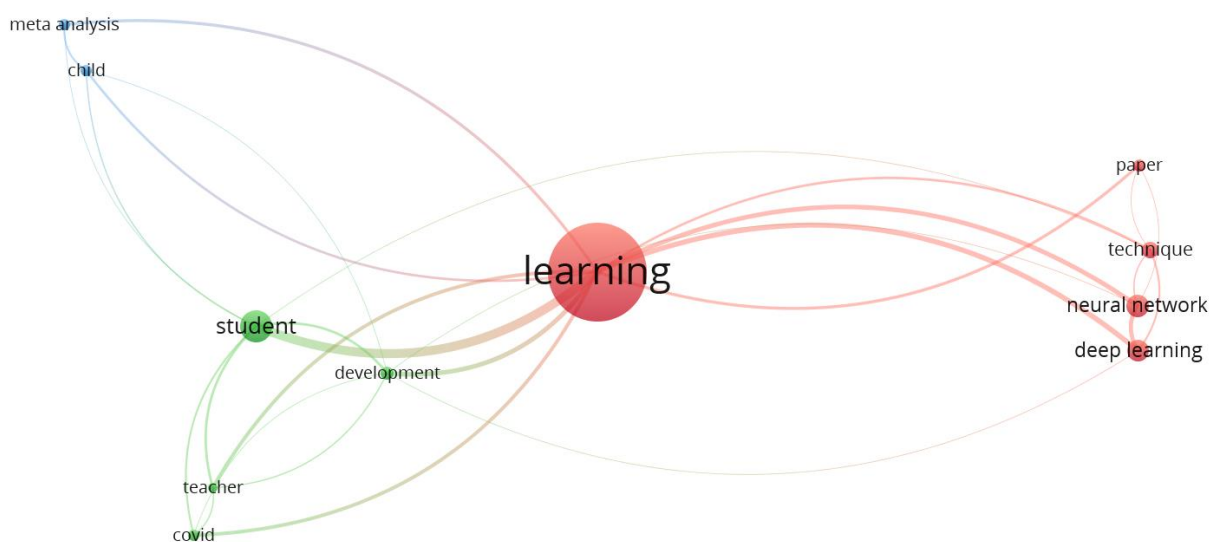

Figure 2. Network Visualization using VOSViewer

The search term "chemistry education bulletin" leads to the conclusion that there are several primary study subjects that are pertinent to the theme. The following list of 11 primary study subjects may be pertinent to the keyword search: a.

   a. Learning: Studies on novel teaching techniques, successful teaching tactics, and learning strategies related to chemistry education.
   b. Students: Pay attention to the traits of students studying chemistry, their comprehension of the subject, and the difficulties they encounter throughout the learning process.
   c. Development: Studies conducted to enhance student learning outcomes through the creation of chemistry curricula, instructional materials, or teaching strategies.
   d. Teacher: Studies on how instructors affect students' understanding of chemistry, as well as successful teaching techniques and programs for chemistry teachers' professional growth.
   e. COVID: Pay attention to how the COVID-19 pandemic affected chemistry education, how to study remotely, or how chemistry education changed as a result of the pandemic.
   f. Child: Studies on the comprehension of chemical ideas by young learners at the elementary or secondary school level.

g. Teaching Chemistry. A bibliometric analysis, also known as a meta-analysis, is a method used to detect important patterns and results in the scientific literature related to chemistry education.

h. Paper: Studies on the application of written materials, homework assignments, or research projects as teaching aids in the teaching of chemistry.

i. Technique: Emphasize the creation or use of performance assessment or instructional methodologies within the framework of chemistry education.

j. Neural Network: Using artificial neural network approaches to study chemistry, including developing intelligent tutoring systems or prediction models.

k. Deep Learning: Studies on the use of machine learning algorithms for chemical data analysis and chemical behavior prediction, as well as the use of deep learning technologies in the context of learning chemistry.

The overview of the numerous topics addressed in the pertinent scientific literature will be provided by the study of general descriptions for bibliometric findings of research studies in various sectors of chemistry education. The learning in chemistry education issue will be the focus of a bibliometric analysis that will showcase effective strategies, cutting-edge methods, and pertinent learning approaches. It will offer light on current advancements in chemistry education as well as new directions in the field of science writing. Bibliometric studies on chemistry students will emphasize the traits of the learners, their comprehension of the material, and the challenges they encounter. This aids in determining the requirements of the pupils and adjusting the methods of instruction.

Regarding development, this review will concentrate on research that seeks to enhance student learning outcomes by creating new chemistry-related curricula, learning resources, or instructional techniques. The impact of instructors on students' comprehension as well as effective teaching strategies and initiatives for chemistry teachers' professional development will be emphasized by bibliometric analysis on the subject of teachers in chemistry education.

The fact that the "chemistry education bulletin" is the most trending subject in the bibliometric study findings suggests that learning is a prominent theme in the scientific literature about the issue. This indicates that the academic community is very interested in learning about innovative teaching methods, effective teaching strategies, and learning tactics for the teaching of chemistry.
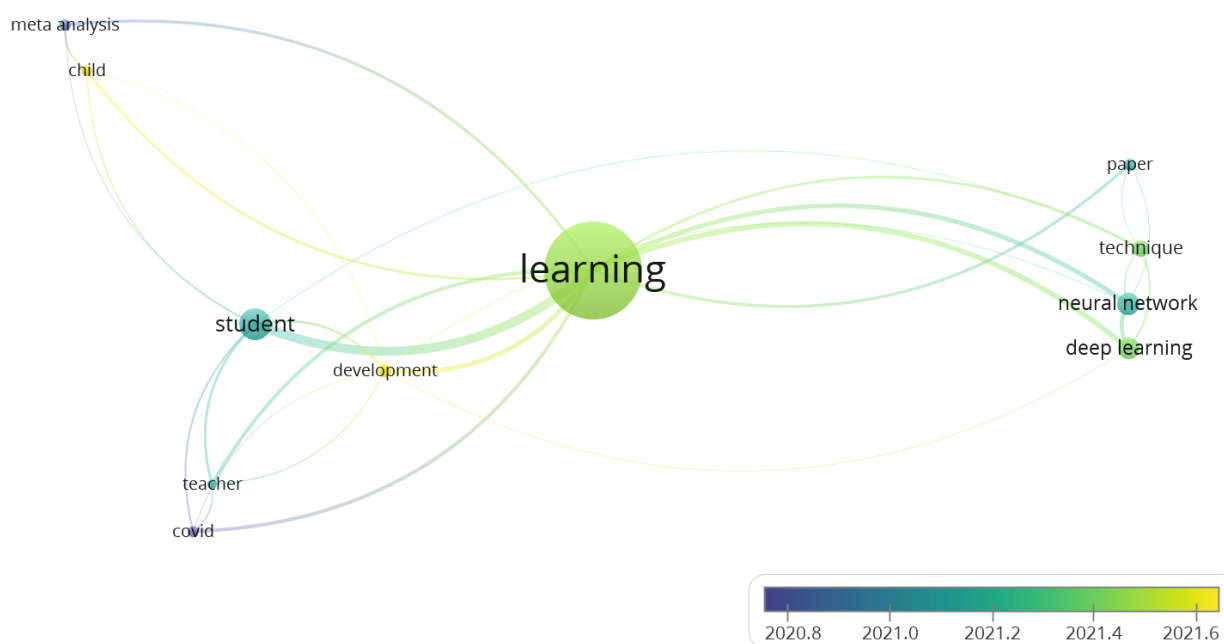

Figure 3. VOSViewer Overlay Visualization Analysis Results

In the bibliometric study findings using VOSViewer Overlay Visualization, the number of trending scientific papers associated with the term "chemical education bulletin" indicates a growth from 2020 to 2021. There is a rise in interest or research focus on the issue, as seen by the 8 publications published in 2020 and 12 articles in 2021. There could be several reasons for this rise in articles, such as a greater understanding of the value of chemistry education, a greater desire to create efficient teaching strategies, or the COVID-19 pandemic's acceleration of the use of technology in distance learning for chemistry. The rise of papers might also indicate that, in 2021, chemical education bulletins will be a more significant and captivating subject for scholars, educators, and legislators. This implies that the issue could garner a lot of attention and discussion in the scientific journals in that particular year.

4. CONCLUSION

A total of 49 scientific publications on the topic of "chemical education bulletin" were published between 2020 and 2024, according to the findings of bibliometric analysis for research with that study issue. With 365 citations overall, it is clear that this study has garnered interest and is being discussed in other scientific publications. With an average of 7.45 citations per article (cites/paper), each publication has a substantial influence on the body of scientific literature. The discovery that learning is the trend of scientific studies for the term "chemical education bulletin" suggests that the creation of novel teaching techniques, efficient learning strategies, and advances in chemical education are often the results of study in this area.

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